REMARKS

The Examiner's attention to the present application is noted with appreciation.

Preliminary Matters and Claims Amendment. It is noted that claims 1 - 26 appear to be allowable, and such claims are not hereafter addressed. Claims 28, 31 and 32, claims 33-39 as dependent from claim 28, claims 34 and 36, claims 41, 44 and 45, claims 46-52 as dependent from claim 41, and claims 47 and 49 are indicated to contain allowable subject matter, but are objected to as being dependent upon unallowed parent claims. Because Applicant argues, as hereafter set forth, that claims 27-52 are allowable, the claims are not rewritten in independent form.

New claims 53 to 56 are added, with claims 53 and 54 being method claims dependent on claim 27, and claims 55 and 56 being apparatus claims dependent on claim 40. Support for the amendment is found, *inter alia*, at page 15, lines 11 to 14.

Obviousness Rejection. Claims 27, 29, 30, 40, 42 and 43, and claims 33, 35, 37-39 as dependent from claims 27 and 29, and claims 46, 48 and 50-52 as dependent from claims 40 and 42, are rejected under 35 U.S.C. § 103(a) as being unpatentable over Conrad et al. (U.S. Patent No. 5,963,329).

Independent claims 27 and 40 are directed to a method and apparatus, respectively, wherein the comparing function comprises "a model comparison of an asymmetric model." Conrad et al. disclose a model and method of adjustment to the model wherein incremental changes in parameters of a theoretical profile are iteratively made, with checking for convergence of the calculated spectral signal with the measured signal within convergence limits. (See FIG. 1 of Conrad et al.) However, Conrad et al. only disclose symmetric model structures (see FIGS. 2, 4, 7 and 10; see also col. 5, lines 27-61). For example, column 7, line 40, of Conrad et al. provides "... and to define the separation between the symmetric left and right edge profiles...."

The teaching of Conrad et al. is further explicit that each "slab" (line profile section, see FIG. 7

which depicts slab layer 1, 2, 3...) requires only three definitional variables; a width w_l, a height d_l, and an index of refraction n_l. Since for a uniform material it may be assumed that the index of refraction n_l is constant, this means that "each slab has two independent values associated with it (a width and a height)..." (Col. 5, lines 53-55). Thus, as Conrad et al. disclose, only "two numbers are needed to describe each slab." (Col. 5, line 55). This necessarily and specifically requires that the "slabs" be symmetric; it is not possible to describe asymmetric slabs with only two numbers. In order to describe a slab that is asymmetric, either with respect to some hypothetical center line of the structure or with respect to another slab, at least three numbers are required; a width, a height and an offset.

This distinction is crucial given the teaching and purpose of Conrad et al. Conrad et al. posit that about 20 slabs are required to adequately represent many profiles found on semiconductor wafers, which results in 40 variables. (Col. 5, lines 51-61). In part novelty in Conrad et al. lies in the discovery that a smaller number of variables may be employed by providing numerical models of sub-profiles, wherein a relatively few scaling factors are used to adjust all slab widths and heights within a single sub-profile simultaneously. (Col. 5, line 62 bridging col. 6, line 20) The objective in Conrad et al. was to reduce the number of variables, such that analysis time can be minimized. Thus Conrad et al. specifically disclose a model which minimizes the number of variables, and which is inherently and by definition symmetric.

An "asymmetric model", as disclosed by the Applicant, includes for example a line with differing left and right side sidewall angles, see, e.g., FIG. 4, or two lines overlaid asymmetrically, see, e.g., FIGS. 13-17. This is neither taught nor anticipated by Conrad et al.

The Office Action asserts that "[t]he use of an appropriate model for the particular lines being measured would have been obvious; when the lines are known to be asymmetrical the use of a model which includes such asymmetry would have clearly been obvious." This assertion is respectfully traversed. The universal assumption is that lines are symmetrical; though there may be variation in the

width, symmetry is assumed. See specification at 2, lines 1 - 5.

The symmetric model posited by Conrad et al. would necessarily result in identical left and right graphs of the diffraction signature. However, Applicant has unexpectedly and surprisingly found that an asymmetric model produces unique and different left and right graphs of the diffraction signature (see, e.g., FIG. 8), and further, and of most importance, that the asymmetric model produces a different graph of the diffraction signature than is produced by a symmetric model, even if the profile of one side of the symmetric model is identical to the profile of one side of the asymmetric model. See, e.g., specification at page 16, line 20, bridging page 17, line 2 ("... a check of the modeled signature data revealed that they are quite distinct when one wall angle is left fixed and other allowed to vary.").

This may be seen by reference to FIG. 4 of the application. In FIG. 4 the first resist profile has right angle side walls, and is symmetric. The second resist profile has the left side wall angle at 90°, but the right side wall angle at 80°. Thus this is an asymmetric resist profile. The third resist profile is the converse; the right side wall angle is 90°, but the left side wall angle at 80°. FIG. 5 depicts the angular scatter signatures. Not only do the asymmetric profiles produce an asymmetric signature, but the signature necessarily differs at all angles between, for example, the first resist profile and the second resist profile, even though the left side wall angle of both is 90°. See, e.g., Specification at 14, line 25 bridging 15, line 14. That is, the Applicant has discovered that the scatter signature is unique for an asymmetric model, even as compared to a symmetric model wherein one side (the left or right side or left or right side wall angle) is identical to the asymmetric model.

Nothing in Conrad et al. suggests or makes obvious that an asymmetric model would produce a unique calculated signature as compared to a symmetric model with "same side" identity. Indeed, Conrad et al. implicitly assume that this is **not** the case. After all, if only one side (or angle of one side) is considered, then a symmetric model can be employed to model that one side just as conveniently as

an asymmetric model. Indeed, the symmetric model has the advantage, as described above, of requiring fewer variables. But Applicant has discovered that this model is not sufficient, and that an asymmetric model will produce a different calculated signature than a symmetric model, even where a side of each (such as the incident light side) is identical. Given the utter and complete failure of Conrad et al. to recognize this important distinction, or indeed to make the relevant discovery, Applicant's invention is not obvious over Conrad et al.

Conclusion. A check for additional claim fees is attached. Authorization is given to charge payment of any additional fees required, or credit any overpayment, to Deposit Acct. 13-4213. A duplicate of this paper is enclosed for accounting purposes. Also being filed herewith is a Petition for Extension of Time to May 24, 2004, with the appropriate fee.

An earnest attempt has been made to respond to each and every ground of rejection advanced by the Examiner. However, should the Examiner have any queries, suggestions or comments relating to a speedy disposition of the application, the Examiner is invited to call the undersigned.

Reconsideration and allowance are respectfully requested.

Respectfully submitted,

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